

Ref #	Hits	Search Query	DBs	Default Operator	Plurals	Time Stamp
L1	1852	((405/124,134) or (52/295,610,745.21,79.9)).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/03/02 16:22
S1	1	("4993872").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/03/02 16:14
S2	649	(405/125,286).CCLS.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/03/02 11:17
S3	12	("1778574" "2413867" "3779021" "4067166" "4993872").PN. OR ("5536113").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/03/02 12:03
S4	18	("1762343" "3686873" "4440527" "4564316" "4790690" "4929125" "4960349" "4961673" "5028172" "5064313").PN. OR ("5456554").URPN.	US-PGPUB; USPAT; USOCR	OR	ON	2005/03/02 12:17
S5	1	("4797030").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/03/02 12:23
S6	1	("4854775").PN.	US-PGPUB; USPAT; USOCR	OR	OFF	2005/03/02 12:23

Best Available Copy


[Home](#) | [News](#) | [Index](#) | [Site Map](#) | [About Us](#) | [Portfolio](#) | [Query](#) | [Forum](#) | [Links](#) | [Visitor Book](#) | [Terms](#)
☒ page contents

[Introduction](#)
[Steel Mesh](#)
[Fibres](#)
☒ base

☒ reinforcement

[Plain Con
Joints for
Reinforce
Formwor](#)
[Exposed
Deco Con
All about
PIC Cons
Stencillin
Deco Tec](#)
[Links](#)

Introduction

Concrete is, by nature, a brittle material that performs well in compression, but is considerably less effective when in tension. Reinforcement in concrete is used to absorb these tensile forces so that the cracking which is inevitable in all high-strength concretes does not weaken the structure.

For many years, steel in the form of bars or mesh (also known as "re-bar") has been used as a reinforcement for concrete slabs that are designed to experience some form of loading, whether that loading would be carrying traffic, spanning a void or bearing another structure such as a wall. In many slabs, steel mesh has also been used as a crude (and often ineffective) method of crack control.

Latest developments in concrete technology now includes reinforcement in the form of fibres, notably polymeric fibres, as well as steel or glass fibres. Fibre-reinforcement is predominantly used for crack control and NOT structural strengthening.

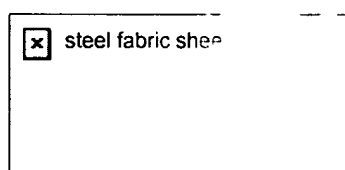
☒ forces within concrete

Steel

Where steel reinforcement of a slab is required for structural reasons the specification will more than likely require high-tensile steel bars as well as fabric mesh and the design should be undertaken by a qualified engineer. Steel mesh comes in a wide array of profiles with varying mesh sizes and wire sizes as indicated in the table opposite.

Fabric Type [square mesh]	Mesh Size mm	Wire Ø mm	Mass per m ²	No. of per T
A98	200x200	5	1.54	5
A142	200x200	6	2.22	4
A193	200x200	7	3.02	3
A252	200x200	8	3.95	2
A393	200x200	9	6.16	1

Table 1 - Welded Steel Fabric for Pavement



Typical steel fabric sheet

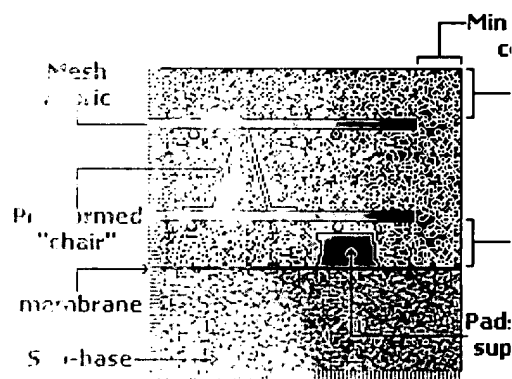


Lapping of fabric sheets

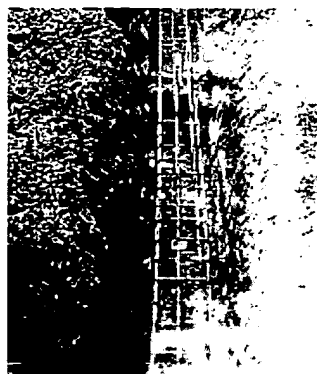
Typically, the mesh, also known as 'fabric', comes in sheets measuring 4800mm x 2400mm which are cut to required size on site by means of a cut-off saw 'croppers'. Where sheets need to be overlapped, the lap should be at least 350mm and the two layers should be lashed together with tie-wire.

The most commonly specified steel fabrics for pavements are A142 (6mm wires), A193 (7mm wires) and A252 (8mm wires). A142 mesh is often used in 100mm thick light-use slabs such as paths, driveways and garage bases, while A252 is normally associated with heavier-duty 150-200mm thick slabs, with A193 used in either. In light-use applications, a single layer of fabric may be used, but in heavier jobs, two layers are used "top and bottom".

There must ALWAYS be a minimum of 50mm cover over steel reinforcement, both above, below and around, as shown in the diagram opposite. The fabric is supported from beneath at regular intervals by padstones which are often broken pressed concrete flagstones, or "chairs", purpose-made plastic or steel supports. These supports are spaced roughly every 600mm or so, sufficient to carry the fabric without allowing it to sag unacceptably.



Cover for steel mesh



Steel in position in ground beam

As mentioned above, high-tensile steel bars are not normally used in pavement slabs unless there are extenuating circumstances, but are regularly used in ground beams and vertical structures. Bar steel is also commonly used in tiled garage and house slabs or roofs where the building is to be constructed from brickwork: by keeping the slab in tension, steel helps prevent cantilevering forces of the brickwork cracking the slab.

Steel-fixing is a trade in itself and is currently beyond the scope of this web-site.

Fibres

While steel reinforcement is still widely used for structural works, the development of fibre reinforcement over the past years has seen a shift away from the traditional steel mesh for crack control in plain concrete work. Special use concretes may be reinforced with steel or glass fibres, but, the most commonly used fibre reinforcement is polymeric, usually polypropylene or polyester.

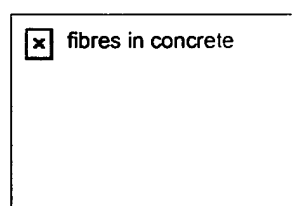
It should be noted that poly-fibres are not a replacement for steel in structural concrete, are of benefit in reducing the incidence of small cracks within the slab brought about by plastic shrinkage and settlement during the curing process. They are often used in conjunction with steel reinforcement.

The fibres are usually polypropylene or polyester filaments and come on various lengths differing according to application. They are added to the mix while it is still in the drum at the rate of around 600-1000g per m³ of concrete. It is essential that the fibres are properly and thoroughly dispersed throughout the mix and are not allowed to 'clump', creating fibre-free areas of concrete. The addition of specialist wetting agents will aid this process. Luckily for us, the concrete batching plants can control all of these parameters and ensure a properly designed and mixed concrete is delivered to the site.

Along with improved crack control, the addition of fibres to a concrete mix has been shown to improve impact resistance and hardness, reduce segregation of aggregates and incidence of bleeding during the curing process, reduce permeability after curing and to offer better frost and fire resistance in the finished slab.

The fibres work by "holding together" the concrete during placement, during the cure and after curing has been completed.

Placement	Fibres help reduce segregation of the fines and the cement immediately following placement, thereby ensuring a more compact concrete.
Curing	Fibres absorb most of the tensile forces caused by the natural shrinkage of the mix as it changes state from a freshly-placed liquid to a fully-cured solid.
In Service	Once the concrete has cured, the effort required to de-bond, stretch and/or break the fibres within the matrix by tensile forces effectively reduce the incidence of surface cracking and the inherent brittleness of a concrete.



x fibres in concrete



Many of today's high-quality batch-mixed concrete will incorporate fibres of one type or another as the relatively low cost is more than justified by the benefit brought about by their inclusion. Most ready-mixed concretes supplied for decorative concrete work reduce the fibre content to achieve the high-quality finish required for that type of prestige paving.



Other interesting resources on this site

- [Plain Concrete](#)
- [Reinforcement for Concrete](#)
- [Joining Concrete Slabs](#)
- [Formwork and Shuttering](#)
- [Writing Specification for Concrete Driveway](#)
- [British Standards for Concrete](#)
- [Introduction to Decorative Concrete](#)
- [All about PIC](#)
- [PIC Construction](#)
- [Stones](#)
- [Exposed Aggregate Concretes](#)
- [Other Alternative Techniques](#)
- [Links](#)



x

Site Map

x

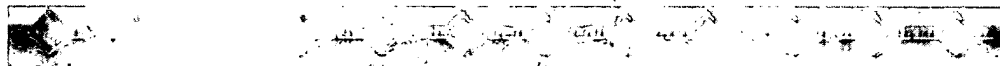
Contact Us

x

Forum

Guest Book

Terms



**This Page is Inserted by IFW Indexing and Scanning
Operations and is not part of the Official Record**

BEST AVAILABLE IMAGES

Defective images within this document are accurate representations of the original documents submitted by the applicant.

Defects in the images include but are not limited to the items checked:

- ☐ BLACK BORDERS
- ☐ IMAGE CUT OFF AT TOP, BOTTOM OR SIDES
- ☒ FADED TEXT OR DRAWING
- ☒ BLURRED OR ILLEGIBLE TEXT OR DRAWING
- ☐ SKEWED/SLANTED IMAGES
- ☐ COLOR OR BLACK AND WHITE PHOTOGRAPHS
- ☐ GRAY SCALE DOCUMENTS
- ☐ LINES OR MARKS ON ORIGINAL DOCUMENT
- ☐ REFERENCE(S) OR EXHIBIT(S) SUBMITTED ARE POOR QUALITY
- ☐ OTHER: _____

IMAGES ARE BEST AVAILABLE COPY.

As rescanning these documents will not correct the image problems checked, please do not report these problems to the IFW Image Problem Mailbox.